

IN THE SPECIFICATION:

Please amend the paragraph starting at page 1, line 18 and ending at line 25, as follows:

--There is known a liquid-phase growth process by way of so-called dipping for forming a crystal thin film on a substrate, where said crystal thin film is formed on the both surfaces of said substrate. In general, only the crystal thin film formed on one surface of the substrate is subjected to practical use and because of this, the crystal thin film formed on the other surface of the substrate is wasted.--

Please amend the paragraph starting at page 2, line 1 and ending at line 3, as follows:

--In order to eliminate this disadvantage, there have been made various proposals which enable formation of to form a crystal thin film only on one surface of a substrate.--

Please amend the paragraph starting at page 2, line 4 and ending at line 17, as follows:

--For instance, Japanese Laid-open Utility Model Publication No. 55(1980)-111970 (hereinafter referred to as "Document 1") discloses a method for growing a crystal film on the front face of a wafer as a substrate by dipping said wafer in a high temperature growth melt, wherein said wafer is dipped in the melt while being held on a wafer holder provided with a platinum plate pate which contacts substantially over the entire back face of said wafer on which no crystal film is grown. It is understood that the platinum plate

pate in this case serves to prevent the back face of the wafer from being contacted with the melt so that only the front face of the wafer on which the crystal film is grown is contacted with the melt.--

Please amend the paragraph starting at page 4, line 19 and ending at line 23, as follows:

--An object of the present invention is to provide a liquid-phase growth process which enables continuous growth of a ~~to continuously grow a~~ high quality crystal film on a plurality of substrates while effectively preventing crystal growth on their back faces, at an improved productivity.--

Please amend the paragraph starting at page 5, line 13 and ending at line 22, as follows:

--In the liquid-phase growth process of the present invention, it is preferred to make the process such that the plurality of substrates are arranged along the solution flow passage of the flowing solution without being overlapped with each other. Of other, of the substrates thus arranged, one or more of them which are positioned in the downstream region of the solution flow passage are recovered, and the remaining substrates positioned upstream of ~~in the upper stream side than~~ the recovered substrates are moved toward a downstream direction by virtue of the flowing solution.--

Please amend the paragraph starting at page 6, line 4 and ending at line 7, as follows:

--In the liquid-phase growth process of the present invention, the flowing solution is preferred to flow be flown at a velocity which is faster than the average speed for the plurality of substrates to be moved.--

Please amend the paragraph starting at page 6, line 8 and ending at line 11, as follows:

--In the liquid-phase growth process of the present invention, it is preferred to make the process such that the flowing solution has a temperature gradient along the solution flow passage of the flowing solution.--

Please amend the paragraph starting at page 6, line 12 and ending at line 17, as follows:

--In the liquid-phase growth process of the present invention, it is preferred to make the process such that the flowing solution is recovered at an end portion of the solution flow passage and a crystallizing material is dissolved in the recovered solution, and the recovered solution is recycled into followed by being flown in the solution flow passage of the flowing solution.

Please amend the paragraph starting at page 6, line 18 and ending at page 7, line 17, as follows:

--A typical embodiment of the liquid-phase growth apparatus of the present invention comprises a solution supply crucible for supplying a solution for liquid-phase epitaxy, a solution flow passage for allowing said solution supplied from said solution

supply crucible to flow therein, and a solution recovery crucible for recovering said solution from said solution flow passage. Said passage, said solution supply crucible is being communicated with said solution flow passage and said solution recovery crucible is being communicated with said solution flow passage. Said passage, wherein said solution flow passage has a substrate supply means provided in the vicinity of said solution supply crucible and a substrate recovery means provided in the vicinity of said solution recovery crucible. Said crucible, wherein said plurality of substrates are consecutively supplied in said solution flow passage by said substrate supply means, followed by being moved in said solution flow passage by virtue of said flowing solution in said solution flow passage while said plurality of substrates are being kept afloat on the surface of said flowing solution, whereby a crystal film is grown on the surfaces of said plurality of substrates which are in contact with said flowing solution, and said plurality of substrates having said crystal film grown thereon are consecutively recovered by said substrate recovery means.--

Please amend the paragraph starting at page 8, line 17 and ending at line 20, as follows:

--In the following, preferred embodiments of the present invention will be detailed with reference to the drawings. It should be understood that the present invention is not restricted by these embodiments.--

Please amend the paragraph starting at page 10, line 9 and ending at line 17, as follows:

--The solution 4 (the melt) contained in the solution supply crucible 1 flows  
into ~~is flown in~~ the solution flow passage 2 through the effluent hole 5 of the solution  
supply crucible 1, + while ~~controlling~~ the flow rate of the solution 4 fluxed from the  
solution supply crucible 1 is controlled by regulating the switching valve provided at the  
effluent hole 5. The solution 4 flowing ~~flown~~ in the solution flow passage 2 in this way is  
allowed ~~followed~~ to naturally flow in the solution flow passage 2 toward the solution  
recovery crucible 3.--

Please amend the paragraph starting at page 11, line 1 and ending at line 8,  
as follows:

--The flow rate of the solution 4 (the melt) should be decided in  
consideration for the crystallizing material in the solution not to be depleted in the  
downstream side of the solution flow passage 2. Incidentally, the flow rate of the solution  
4 (the melt) may be decided in accordance with the size of the effluent hole 5, that of the  
discharge hole 6, and the cross section form and the gradient of the solution flow passage  
2.--

Please amend the paragraph starting at page 12, line 13 and ending at line  
23, as follows:

--In the present invention, the substrate 10 is preferred to comprise a  
substrate having a density which is less ~~smaller~~ than that of the solution 4 (the melt). This  
makes it possible for ~~that~~ the substrate 10 is moved to reach the downstream side of the  
solution flow passage 2 following the flow of the solution 4 (the melt) while being kept

afloat on the surface of the solution 4. At every time when the substrate is moved to reach the downstream side of the solution flow passage 2, other substrates accommodated in the substrate cassette 12 are sequentially supplied in the solution flow passage 2.--

Please amend the paragraph starting at page 13, line 8 and ending at line 20, as follows:

--As above described, according to the liquid-phase growth process of the present invention, a crystal film can be effectively grown only on one surface of a given substrate on a desired side thereof solely by virtue of the flow of a solution (a melt) comprising a crystallizing material dissolved in a metal solvent in a supersaturated state. To be more specific, a plurality of substrates can be moved as required solely by virtue of the flow of said solution without using any particular jig or transportation mechanism, where a crystal film can be continuously grown on said plurality of substrates with respect to only their one side of their surfaces. This enables to efficiently mass-produced mass-produce products having a crystal film.--

Please amend the paragraph starting at page 13, line 21 and ending at page 14, line 4, as follows:

--Now, in the solution flow passage 2 in which the solution 4 (the melt) flows from the upstream side toward the downstream side, the temperature of the solution 4 is preferred to be controlled by means of the heater 7 such that it is gradually lowered as the solution approaches the downstream side of the solution flow passage 2, so that a

crystal film can be epitaxially grown on the substrate 10 at a desired growth speed even at a position in the downstream side of the solution flow passage 2. --

Please amend the paragraph starting at page 14, line 5 and ending at line 16, as follows:

--Separately, in order to prevent the crystallizing material contained in the solution 4 from being depleted in the downstream region of the solution flow passage 2, it is possible to adopt a manner in that the cross section form of the solution flow passage 2 is varied so that the sectional area of the solution 4 becomes ~~to be~~ gradually smaller as the solution 4 approaches the downstream region of the solution flow passage 2. In this case, the cross section form of the solution flow passage 2 is varied, for instance, such that the width of the solution flow passage 2 is relatively widened in the upstream region and the width thereof is relatively narrowed in the downstream region.--

Please amend the paragraph starting at page 14, line 17 and ending at page 15, line 1, as follows:

--As previously described, in the solution flow passage 2, a plurality of substrates 10 are continuously supplied and they are moved toward the downstream side by virtue of the solution 4 (the melt) which flows is flown in the solution flow passage 2, where the plurality of substrates 10 are intermittently supplied at a prescribed time interval so that they are not mutually overlapped. In order to prevent the plurality of substrates 10 from being mutually overlapped in this case, it is possible to arrange a separation member (not shown) between each adjacent substrates.--

Please amend the paragraph starting at page 15, line 2 and ending at line 6, as follows:

--The plurality of substrates 10 supplied in the solution flow passage 2 in the above-described way may be moved in a state that each adjacent substrate substrates (including a case where said separation member is provided between them) is of them are mutually contacted.--

Please amend the paragraph starting at page 16, line 1 and ending at line 13, as follows:

--Now, as shown in FIG. 3, the substrates 10, 10 which are successively carried from the upstream side of the solution flow passage 2 following the flow of the solution 4 (the melt) while a crystal film being epitaxially grown thereon, thereon are suspended in a terminal region of the solution flow passage 2 for a prescribed period of time. Thereafter, time and thereafter, they are extruded one by one onto the slant portion 18 by means of the recovery member 17, followed by being further extruded to enter in the substrate cassette 16 by means of the recovery member 17. The substrates 10 which are successively entered in the substrate cassette 16 in this way are sequentially accommodated in the substrate cassette 16.--

Please amend the paragraph starting at page 17, line 19 and ending at page 18, line 9 as follows:

--In this case, for instance, it is possible to adopt a manner of repeating an operation wherein the movement of the substrates 10 situated in the terminal region of the

downstream region of the solution flow passage 2 is controlled so as to stop the substrates from moving for a prescribed period of time where other substrates 10 which are situated in the upstream region of the solution flow passage 2 are also stopped from moving, thereafter the former substrates are recovered, and following this, the aforesaid other substrates concurrently are moved toward the downstream region. According to this method, during the stopping time of the substrates, the steady flow of the solution 4 (the melt) is contacted with the faces of the substrates which are in contact with the solution. This contributes to uniforming the crystal films grown on said substrate faces.--

Please amend the paragraph starting at page 19, line 4 and ending at line 12, as follows:

--The supply of the aforesaid crystallizing material into the used solution (the used melt) may be performed by a manner wherein a crystallizing material shaped in a plate form or a wafer form is immersed in the solution while being retained on a carrier, a manner wherein a powdery crystallizing material is introduced into the used solution or a manner wherein a gaseous material as the crystallizing material is subjected to bubbling in the used solution through a conduit.--

Please amend the paragraph starting at page 19, line 13 and ending at line 22, as follows:

--In the present invention, the liquid-phase growth apparatus may be constituted by combining a plurality of solution flow passages having such a constitution as shown in FIGs. 1(a) and 1(b). FIG. 4 is a schematic top view illustrating an embodiment of

such a liquid-phase growth apparatus in which two solution flow passages 2 having such a constitution as shown in FIGS. 1(a) and 1(b) are combined, except that said two solution flow passages are made different one from the other in terms of the flow direction of the solution 4 (the melt) ~~to be flown~~--

Please amend the paragraph starting at page 19, line 23 and ending at page 20, line 6, as follows:

--In the liquid-phase growth apparatus shown in FIG. 4, ~~as shown in FIG. 4,~~ the two solution flow passages are arranged such that the solution supply crucible 1 and the solution recovery crucible 3 in one solution flow passage are respectively adjacent to the solution recovery crucible 3 and the solution supply crucible 1 in the other solution flow passage. Because of this, the exchange of the solution supply crucible with the solution recovery crucible can be more smoothly performed.--

Please amend the paragraph starting at page 20, line 19 and ending at line 24, as follows:

--Now, in the case where a magnetic garnet crystal film which is used in a magnetic optical element is formed form by way of liquid-phase epitaxial growth, as the solution 4 (the melt), there is used, for instance, a solution obtained by dissolving a garnet raw material as the crystallizing material in a solvent comprising PbO and B<sub>2</sub>O<sub>3</sub>.--

Please amend the paragraph starting at page 22, line 6 and ending at line 9, as follows:

--As the solution 4 (the melt), a supersaturated solution of silicon (Si) obtained by dissolving silicon (Si) in 28 liters liter of a metal solvent consisting of indium (In) at 930 °C in a supersaturated state is used.-

Please amend the paragraph starting at page 22, line 22 and ending at page 23, line 1, as follows:

--The solution supply crucible 1 is communicated with the solution flow passage 2 through the effluent hole 5 such that the solution 4 contained in the solution supply crucible 1 flows is flown in the solution flow passage 2 through the effluent hole 5.--

Please amend the paragraph starting at page 23, line 2 and ending at line 12, as follows:

--The effluent hole 5 of the solution supply crucible 1 is provided with a switching valve (not shown) capable of opening or closing the effluent hole 5. By regulating the switching valve provided at the effluent hole 5, it is possible to control the flow rate of the solution 4 (the melt) which is fluxed from the solution supply crucible 1 into the solution flow passage 2. In this example, it is made such that the solution 4 contained in the solution supply crucible 1 flows is flown in the solution flow passage 2 at a flow rate of 2.8 liters liter per a minute.--

Please amend the paragraph starting at page 23, line 13 and ending at line 22, as follows:

--The solution flow passage 2 is formed of a graphite carbon such that the cross section thereof has a depth of 1 cm and a width of 13 cm and the total length thereof is 29 m. And the solution flow passage 2 is designed such that it has a grade which is gently sloped in a direction from the side of the solution supply crucible 1 toward the side of the solution recovery crucible 3 so as to allow the solution 4 to flow in the solution flow passage 2 at a flow speed of 21.3 cm per a minute.--

Please amend the paragraph starting at page 23, line 23 and ending at page 24, line 2, as follows:

--The aforesaid ~~Aforesaid~~ plurality of Si-single crystal wafers as the substrates 10 are accommodated in the substrate supply equipment 11, and they are intermittently extruded at a time interval of 5.2 seconds in the solution flow passage 2 from the substrate supply equipment 11.--

Please amend the paragraph starting at page 24, line 3 and ending at line 7, as follows:

--The substrate recovery equipment 15 arranged in the downstream side of the solution flow passage 2 intermittently recovers the substrates 10 which are carried following the flow of the solution 4 in the solution flow passage 2 at a time interval of 5.2 seconds.--

Please amend the paragraph starting at page 24, line 8 and ending at line 25, as follows:

--In this example, in the solution flow passage 2, 230 substrates 10 are kept afloat on the surface of the flowing solution 4 while being contacted with each other through their side faces. Of these substrates being kept afloat on the surface of the flowing solution in this way, when the terminal one is recovered by the substrate recovery equipment 15, along with this, the remaining substrates present in the upstream side of the solution flow passage 2 are concurrently moved toward the area where said terminal substrate has been present. When present, where when the terminal substrate in the downstream region of the solution flow passage 2 reaches the substrate recovery equipment 15, said terminal substrate is stopped there and, and along with this, the succeeding substrates are stopped from moving. This operation is repeated, where each of the plurality of substrates travels in the solution flow passage 2 for 20 minutes at an average speed of 14. 4 cm per a minute.--

Please amend the paragraph starting at page 25, line 1 and ending at line 11, as follows:

--The temperature of the flowing solution 4 in the solution flow passage 2 is controlled such that it is gradually lowered from the upstream side toward the downstream side, specifically, for instance, such that it is 920 °C in the region in the vicinity of the substrate supply equipment 11 and it is 880 °C in the region in the vicinity of the substrate recovery equipment 15. In this case, each substrate proceeds in the solution flow passage 2 for 20 minutes. This means that the temperature of the flowing solution 4 in contact with the substrate is lowered at a temperature-descending speed of 2 °C per a minute.--

Please amend the paragraph starting at page 25, line 12 and ending at line 18, as follows:

--As a result, a silicon single crystal film is grown on the surface of each substrate which is contacted with the flowing solution 4 at a film-growing speed of 1.5  $\mu\text{m}$  per a minute. That is, it is possible to form a silicon single crystal film having a thickness of 30  $\mu\text{m}$  on each substrate at a throughput of 690 substrate products having said silicon single crystal film in every hour.--

Please amend the paragraph starting at page 26, line 9 and ending at line 15, as follows:

--There are realized a liquid-phase growth process and a liquid-phase growth apparatus having a markedly improved quantitative productivity. That is, it is possible to continuously and efficiently grow a desired crystal film on a plurality of substrates while effectively preventing unnecessary crystal growth on their back faces without using such a complicated jig as used in the prior art.--

Please amend the paragraph starting at page 26, line 16 and ending at page 27, line 8, as follows:

--Particularly, said plurality of substrates are moved following the flow of the solution (the melt) for liquid-phase epitaxy. The solution flows which is flowing in the solution flow passage, and the substrates are while being kept afloat on the surface of said flowing solution in the solution flow passage by one side of through their one surfaces. The and while said plurality of substrates are being prevented from being mutually

overlapped, and where the surfaces of the plurality of substrates which are in contact with said solution are contacted with the steady flow of said solution. This makes the crystal films grown on the surfaces of the plurality of substrates ~~to have an~~ uniform in thickness. And a desired crystal-growing speed can be maintained also in the downstream region of the solution flow passage because the crystallizing material contained in the solution is not depleted ~~there~~. Further, even when an expensive metal solvent is used as the metal solvent of the solution for liquid-phase epitaxy, it can be repeatedly used. This diminishes makes ~~to diminish~~ the production cost of a product.--